

SEQUENCE LISTING

<110> National Institute of Agrobiological Sciences

<120> Sodium/Proton antiporter gene

<130> MOA-006PCT

<150> JP 1998-365604

<151> 1998-12-22

<160> 2

<170> PatentIn Ver. 2.0

<210> 1

<211> 2330

<212> DNA

<213> Oryza sativa

<220>

<221> CDS

<222> (297)..(1901)

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accaaatccc gatttctcaa cctgaatccc ccccccacgt tcctcgttt aatctgttgc 120

tctgcgaatc gaattcttgc ttttttttc tctaattttt ccggaaatttgc tcgaattttagg 180

cattcaccaa cgagcaagag gggagtggtt aagctccgca tcttgcggcg 240

gaaatctcg tctctctct gcgggggtt gcccggagaag tcgcccgg tgaggc atg 299

Met

1

ggg atg gag gtg gcg gcg cggtt ggg gct ctgtt tac acgtt acc tcc 347

Gly Met Glu Val Ala Ala Ala Arg Leu Gly Ala Leu Tyr Thr Thr Ser

5

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15

gac tac gcg tgc gtg gtg tcc atc aac ctg ttc gtc gcg ctgtt ctc tgc 395

Asp Tyr Ala Ser Val Val Ser Ile Asn Leu Phe Val Ala Leu Leu Cys

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gcc tgc atc gtc ctc ggc cac ctc ctc gag gag aat cgc tgg gtc aat 443

Ala Cys Ile Val Leu Gly His Leu Leu Glu Glu Asn Arg Trp Val Asn

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gag tcc atc acc gcg ctc atc atc ggg ctc tgc acc ggc gtgtt gtc atc 491

Glu Ser Ile Thr Ala Leu Ile Ile Gly Leu Cys Thr Gly Val Val Ile

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ttg ctg atg acc aaa ggg aag agc tcg cac tta ttc gtc ttc agt gag 539

Leu Leu Met Thr Lys Gly Lys Ser Ser His Leu Phe Val Phe Ser Glu

70

75

80

gat ctc ttc ttc atc tac ctc ctc cct ccg atc atc ttc aat gca ggt 587

Asp Leu Phe Phe Ile Tyr Leu Leu Pro Pro Ile Ile Phe Asn Ala Gly

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90

95

ttt cag gta aag aaa aag caa ttc ttc cgg aat ttc atg acg atc aca 635

Phe Gln Val Lys Lys Gln Phe Phe Arg Asn Phe Met Thr Ile Thr

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tta ttt gga gcc gtc ggg aca atg ata tcc ttt ttc aca ata tct att 683

Leu Phe Gly Ala Val Gly Thr Met Ile Ser Phe Phe Thr Ile Ser Ile

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gct gcc att gca ata ttc agc aga atg aac att gga acg ctg gat gta 731

Ala Ala Ile Ala Ile Phe Ser Arg Met Asn Ile Gly Thr Leu Asp Val

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gga gat ttt ctt gca att gga gcc atc ttt tct gcg aca gat tct gtc 779

Gly Asp Phe Leu Ala Ile Gly Ala Ile Phe Ser Ala Thr Asp Ser Val

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tgc aca ttg cag gtc ctc aat cag gat gag aca ccc ttt ttg tac agt 827
 Cys Thr Leu Gln Val Leu Asn Gln Asp Glu Thr Pro Phe Leu Tyr Ser

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ctg gta ttc ggt gaa ggt gtt gtg aac gat gct aca tca att gtg ctt 875
 Leu Val Phe Gly Glu Gly Val Val Asn Asp Ala Thr Ser Ile Val Leu
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ttc aac gca cta cag aac ttt gat ctt gtc cac ata gat gcg gct gtc 923
 Phe Asn Ala Leu Gln Asn Phe Asp Leu Val His Ile Asp Ala Ala Val
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gtt ctg aaa ttc ttg ggg aac ttc ttt tat tta ttt ttg tcg agc acc 971
 Val Leu Lys Phe Leu Gly Asn Phe Phe Tyr Leu Phe Leu Ser Ser Thr
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ttc ctt gga gta ttt gct gga ttg ctc agt gca tac ata atc aag aag 1019
 Phe Leu Gly Val Phe Ala Gly Leu Leu Ser Ala Tyr Ile Ile Lys Lys
 230 235 240

cta tac att gga agg cat tct act gac cgt gag gtt gcc ctt atg atg 1067
 Leu Tyr Ile Gly Arg His Ser Thr Asp Arg Glu Val Ala Leu Met Met
 245 250 255

ctc atg gct tac ctt tca tat atg ctg gct gag ttg cta gat tig agc 1115
 Leu Met Ala Tyr Leu Ser Tyr Met Leu Ala Glu Leu Leu Asp Leu Ser

260

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ggc att ctc acc gta ttc ttc tgt att gta atg tca cat tac act 1163

Gly Ile Leu Thr Val Phe Phe Cys Gly Ile Val Met Ser His Tyr Thr

275

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285

tgg cat aac gtc aca gag agt tca aga gtt aca aca aag cac gca ttt 1211

Trp His Asn Val Thr Glu Ser Ser Arg Val Thr Thr Lys His Ala Phe

290

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300

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gca act ctg tcc ttc att gct gag act ttt ctc ttc ctg tat gtt ggg 1259

Ala Thr Leu Ser Phe Ile Ala Glu Thr Phe Leu Phe Leu Tyr Val Gly

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atg gat gca ttg gat att gaa aaa tgg gag ttt gcc agt gac aga cct 1307

Met Asp Ala Leu Asp Ile Glu Lys Trp Glu Phe Ala Ser Asp Arg Pro

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ggc aaa tcc att ggg ata agc tca att ttg cta gga ttg gtt ctg att 1355

Gly Lys Ser Ile Gly Ile Ser Ser Ile Leu Leu Gly Leu Val Leu Ile

340

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gga aga gct ttt gta ttc ccg ctg tcg ttc ttg tcg aac cta aca 1403

Gly Arg Ala Ala Phe Val Phe Pro Leu Ser Phe Leu Ser Asn Leu Thr

355

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aag aag gca ccg aat gaa aaa ata acc tgg aga cag caa gtt gta ata	1451		
Lys Lys Ala Pro Asn Glu Lys Ile Thr Trp Arg Gln Gln Val Val Ile			
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tgg tgg gct ggg ctg atg aga gga gct gtg tcg att gct ctt gct tac	1499		
Trp Trp Ala Gly Leu Met Arg Gly Ala Val Ser Ile Ala Leu Ala Tyr			
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aat aag ttt aca aga tct ggc cat act cag ctg cac ggc aat gca ata	1547		
Asn Lys Phe Thr Arg Ser Gly His Thr Gln Leu His Gly Asn Ala Ile			
405	410	415	
atg atc acc agc acc atc act gtc gtt ctt ttt agc act atg gta ttt	1595		
Met Ile Thr Ser Thr Ile Thr Val Val Leu Phe Ser Thr Met Val Phe			
420	425	430	
ggg atg atg aca aag cca ttg atc agg ctg ctg cta ccg gcc tca ggc	1643		
Gly Met Met Thr Lys Pro Leu Ile Arg Leu Leu Leu Pro Ala Ser Gly			
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cat cct gtc acc tct gag cct tca tca cca aag tcc ctg cat tct cct	1691		
His Pro Val Thr Ser Glu Pro Ser Ser Pro Lys Ser Leu His Ser Pro			
450	455	460	465
ctc ctg aca agc atg caa ggt tct gac ctc gag agt aca acc aac att	1739		
Leu Leu Thr Ser Met Gln Gly Ser Asp Leu Glu Ser Thr Thr Asn Ile			

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gtg agg cct tcc agc ctc cgg atg ctc ctc acc aag ccg acc cac act 1787

Val Arg Pro Ser Ser Leu Arg Met Leu Leu Thr Lys Pro Thr His Thr

485

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gtc cac tac tac tgg cgc aag ttc gac gac gcg ctg atg cga ccg atg 1835

Val His Tyr Tyr Trp Arg Lys Phe Asp Asp Ala Leu Met Arg Pro Met

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ttt ggc ggg cgc ggg ttc gig ccc ttc tcc cct gga tca cca acc gag 1883

Phe Gly Gly Arg Gly Phe Val Pro Phe Ser Pro Gly Ser Pro Thr Glu

515

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cag agc cat gga gga aga tgaacagtgaaaggaaatgaaatggaaatg 1931

Gln Ser His Gly Gly Arg

530

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gttgtatgagg agaaatacatg taaaatgtga cagcaaaaga gagaaggcaa gttttgggtt 1991

tgttagattt ggctgcgtgt aatgagttgt tataatgtgcc tataatcttc agaacttcag 2051

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<213> Oryza sativa

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Cys Ala Cys Ile Val Leu Gly His Leu Leu Glu Glu Asn Arg Trp Val

35	40	45
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Asn Glu Ser Ile Thr Ala Leu Ile Ile Gly Leu Cys Thr Gly Val Val

50	55	60
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Ile Leu Leu Met Thr Lys Gly Lys Ser Ser His Leu Phe Val Phe Ser

65

70

75

80

Glu Asp Leu Phe Phe Ile Tyr Leu Leu Pro Pro Ile Ile Phe Asn Ala

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Gly Phe Gln Val Lys Lys Lys Gln Phe Phe Arg Asn Phe Met Thr Ile

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Thr Leu Phe Gly Ala Val Gly Thr Met Ile Ser Phe Phe Thr Ile Ser

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Ile Ala Ala Ile Ala Ile Phe Ser Arg Met Asn Ile Gly Thr Leu Asp

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Val Gly Asp Phe Leu Ala Ile Gly Ala Ile Phe Ser Ala Thr Asp Ser

145

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155

160

Val Cys Thr Leu Gln Val Leu Asn Gln Asp Glu Thr Pro Phe Leu Tyr

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Ser Leu Val Phe Gly Glu Gly Val Val Asn Asp Ala Thr Ser Ile Val

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190

Leu Phe Asn Ala Leu Gln Asn Phe Asp Leu Val His Ile Asp Ala Ala

195

200

205

Val Val Leu Lys Phe Leu Gly Asn Phe Phe Tyr Leu Phe Leu Ser Ser

210

215

220

Thr Phe Leu Gly Val Phe Ala Gly Leu Leu Ser Ala Tyr Ile Ile Lys

225

230

235

240

Lys Leu Tyr Ile Gly Arg His Ser Thr Asp Arg Glu Val Ala Leu Met

245

250

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Met Leu Met Ala Tyr Leu Ser Tyr Met Leu Ala Glu Leu Leu Asp Leu

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265

270

Ser Gly Ile Leu Thr Val Phe Phe Cys Gly Ile Val Met Ser His Tyr

275

280

285

Thr Trp His Asn Val Thr Glu Ser Ser Arg Val Thr Thr Lys His Ala

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Phe Ala Thr Leu Ser Phe Ile Ala Glu Thr Phe Leu Phe Leu Tyr Val

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Gly Met Asp Ala Leu Asp Ile Glu Lys Trp Glu Phe Ala Ser Asp Arg

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330

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Pro Gly Lys Ser Ile Gly Ile Ser Ser Ile Leu Leu Gly Leu Val Leu

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345

350

Ile Gly Arg Ala Ala Phe Val Phe Pro Leu Ser Phe Leu Ser Asn Leu

355

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365

Thr Lys Lys Ala Pro Asn Glu Lys Ile Thr Trp Arg Gln Gln Val Val

370

375

380

Ile Trp Trp Ala Gly Leu Met Arg Gly Ala Val Ser Ile Ala Leu Ala

385

390

395

400

Tyr Asn Lys Phe Thr Arg Ser Gly His Thr Gln Leu His Gly Asn Ala

405

410

415

Ile Met Ile Thr Ser Thr Ile Thr Val Val Leu Phe Ser Thr Met Val

420

425

430

Phe Gly Met Met Thr Lys Pro Leu Ile Arg Leu Leu Leu Pro Ala Ser

435

440

445

Gly His Pro Val Thr Ser Glu Pro Ser Ser Pro Lys Ser Leu His Ser

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460

Pro Leu Leu Thr Ser Met Gln Gly Ser Asp Leu Glu Ser Thr Thr Asn

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Ile Val Arg Pro Ser Ser Leu Arg Met Leu Leu Thr Lys Pro Thr His

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490

495

Thr Val His Tyr Tyr Trp Arg Lys Phe Asp Asp Ala Leu Met Arg Pro

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Met Phe Gly Gly Arg Gly Phe Val Pro Phe Ser Pro Gly Ser Pro Thr

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Glu Gln Ser His Gly Gly Arg

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535